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TRICHODACTYLIDAE FROM VENEZUELA, COLOMBIA, AND ECUADOR (CRUSTACEA: BRACHYURA)

ALFRED E. SMALLEY

Department of Biology, Tulane University, New Orleans, Louisiana 70118

and

GILBERTO RODRIGUEZ

Instituto Venezolano de Investigaciones Cientificas, Apartado 1827, Caracas, Venezuela

ABSTRACT

The freshwater crabs of the family Trichodactylidae from Venezuela, Colombia, and Ecuador, are described. Species considered are *Trichodactylus* (*Rodriguezia*) *quinquedentatus*, *Sylviocarcinus torresi*, *S. piriformis*, *S.* ***gigas*** (new from Amazon drainage of Colombia), *S. pictus*, *Zilchiopsis ecuadoriensis*, *Valdivia serrata*, *V. venezuelensis*, *Dilocarcinus* (*Dilocarcinus*) *niceforei*, *D.* (*D.*) *dentatus*, and *D.* (*D.*) ***medemi*** (new from northern Colombia).

INTRODUCTION

The limited material of freshwater crabs from South America available for taxonomic studies has been an important factor contributing to the confusion over their classification. We have been able to collect, and acquire from other collectors, material from several areas in northern South America, and are thus able to present descriptions and figures which we hope will resolve some current problems and help future workers overcome the current chaotic conditions in freshwater crab taxonomy. Included in our material are two new species from Colombia.

There is no classification which will satisfactorily accommodate all of the species discussed in this paper. We have chosen to follow Bott (1969) rather than Pretzmann (1968b), mainly because Bott provides adequite descriptions and justification for his genera and subgenera, as well as a key which will serve for all of the material discussed below. We have not examined enough material from Brazil and Argentina to enable us to evaluate and compare the two classifications in complete detail. We do not recognize *Forsteria*, which includes only one species, *Valdivia venezuelensis*.

Bott has a more inclusive concept of the lower taxa than either Pretzmann or ourselves, so it often happens that we will recognize species which Bott will consider merely a variation of some other species or subspecies. In addition, we have tried to avoid subspecies altogether, since in our opinion many of the subspecies of freshwater crabs described in recent years are based on entirely inadequate material.

The species from Venezuela, Colombia, and Ecuador discussed in this paper are as follows:

Trichodactylus (*Rodriguezia*) *quinquedentatus* Rathbun, 1893

Sylviocarcinus torresi (Pretzmann, 1968)

Sylviocarcinus piriformis (Pretzmann, 1968)

Sylviocarcinus gigas new species

Sylviocarcinus pictus (Milne Edwards, 1853)

Zilchiopsis ecuadoriensis (Pretzmann, 1968)

Valdivia serrata White, 1847
Valdivia venezuelensis Rathbun, 1906
Dilocarcinus (*Dilocarcinus*) *niceforei* (Schmitt and Pretzmann, 1968)
Dilocarcinus (*Dilocarcinus*) *dentatus* (Randall, 1839)
Dilocarcinus (*Dilocarcinus*) *medemi* new species

Measurements

Abbreviations are used for the most common measurements, as follows: (cb), carapace breadth, the greatest width of the carapace; (cl), carapace length, the median length of the carapace; (fow), fronto-orbital width, the distance between the outer orbital angles; (ft), front, the part of the anterior margin of the carapace delimited by the outermost points of the concave curve where the front of the carapace begins to form the posterior border of the orbit. Measurements are always given in this order. In some species, where good series are available from one locality, only representative measurements are given, since the linear proportion of parts of the carapace remains the same in crabs of different size. This is established for a species of Pseudothelphusidae by Chace and Hobbs (1969), and is also true for Trichodactylidae.

Acknowledgments

Material from Colombia and Ecuador was especially collected and sent to us by Mr. Manuel Olalla (Quinto), Mr. Agustín Zamora (Santa Marta), and Brother Niceforo Maria (Bogotá). A collection of decapod Crustacea donated to Tulane University by Dr. Frederico Medem (Cartagena) contained two species of Trichodactylidae. Specimens from the National Museum of Natural History were kindly provided by Dr. Waldo L. Schmitt and Mr. Henry B. Roberts. Dr. Dale Little and Mr. Gary Epler (Tulane University) contributed specimens from Colombia collected during research on paragonimiasis; Dr. N. R. Foster sent some crabs from Venezuela. Mr. Jackson E. Lewis examined the holotype of *Trichodactylus quinquedentatus* for us. To all of these we wish to express our deepest appreciation.

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Key to the Trichodactylidae of Venezuela, Colombia, and Ecuador

1. Anterolateral border of carapace bearing 2–5 teeth, excluding orbital 2
1. Anterolateral border of carapace bearing 7–9 teeth, excluding orbital ..... *Dilocarcinus* 9
2. All abdominal segments free in both sexes; gonopod short, straight; 5 teeth on anterolateral border of carapace, excluding orbital angle; small species ..... *Trichodactylus* (*Rodriguezia*) *quinquedentatus*
2. Abdominal segments 3–5 or 3–6 fused 3
3. Male gonopods curving inward ..... *Sylviocarcinus* 4
3. Male gonopods curving outward, or nearly straight 7
4. Outer edge of gonopod with strong protuberance or hump 5
4. Outer edge of gonopod nearly straight 6
5. Gonopod stout (Fig. 6) ..... *Sylviocarcinus gigas*
5. Gonopod slender (Fig. 8) ..... *Sylviocarcinus pictus*
6. Margin of gonopod curved laterad so as to disappear around outer edge; spines of caudal area sparse ..... *Sylviocarcinus torresi*
6. Margin of gonopod straight, not disappearing around outer edge; spines of caudal area dense; range does not overlap with *S. torresi* ..... *Sylviocarcinus piriformis*
7. Male gonopod nearly straight; armed with heavy setae or light spines ..... *Zilchiopsis ecuadoriensis*
7. Male gonopod curved outward; at least some of the spines heavy ..... *Valdivia* 8
8. Distal portion of gonopod with approximately parallel sides ..... *Valdivia serrata*
8. Distal portion of gonopod curved; strong lateral protuberance ..... *Valdivia venezuelensis*

9. Gonopod strongly curved distally; tip bulbous ..... *Dilocarcinus niceforei*
9. Gonopod gently curved distally; tip slender or slightly bulbous 10
   10. Margin curving outward around gonopod; marginal protuberance bearing setae obtuse ..... *Dilocarcinus dentatus*
   10. Margin not curving outward around gonopod; marginal protuberance bearing setae acute ..... *Dilocarcinus medemi*

Systematic Account

Trichodactylus (*Rodriguezia*) *quinquedentatus* Rathbun, 1893

Figs. 1 and 2

Trichodactylus quinquedentatus Rathbun, 1893, p. 660, Pl. LXXVII, Fig. 7.

T. (*Trichodactylus*) *quinquedentatus.* Rathbun, 1906, p. 42, Pl. XV, Fig. 3; Pretzmann, 1968b, p. 70.

T. (*Rodriguezia*) *quinquedentatus.* Bott, 1969, p. 27.

Description: Carapace subcircular, widest at level of fourth lateral spine, very convex anteriorly-posteriorly. Front bilobed, produced. Outer margin of orbit rounded, not produced as spine or sharp angle. Antero-lateral margin of carapace strongly arcuate, armed with five teeth, not including orbital angle. Lobe between outer orbital angle and first carapace tooth; first three teeth larger than fourth and fifth; fifth tooth small, on posterior margin of carapace; first and second teeth curving anteriorly, forming elongate notches between teeth and carapace margin. Lower margin of orbit not tuberculate, with deep sinus about three-fourths distance from lateral border of orbit; termination of margin smooth or with sharp tooth; female holotype with low protuberance; sinus followed medially by strong tooth, blunt or sharp, directed medially, somewhat appressed. Antero-lateral margin of buccal angle unarmed.

Chelipeds of largest male very unequal, hand of largest cheliped being as long as carapace wide. Merus with sharp spine on outer border; similar spine on inner margin; upper border ending in sharp tooth. Carpus with long hooked spine on inner margin. Surface of cheliped polished, densely covered with punctae visible to naked eye.

Abdominal segments all free in both sexes. Seventh abdominal segment of male broadly rounded.

Gonopod short, straight, with truncated apex; lateral surface and mesial surface each with irregular longitudinal row of blunt, conical, slightly recurved spines. Marginal setae moderately developed, born on gently rounded protuberance. Second gonopod longer than first.

Color: Specimens preserved in alcohol are reddish brown. The large chela of the largest male has a reddish palm and the fingers are a creamy white.

Size: This is a small species; Pearse (1921) noted that the largest specimen in a collection of a hundred had a cb. of 25.5 mm.

Material Examined: Colombia: Rio Fundación, near Santa Marta, Depto. Magdalena; 13 Nov 1967; Agustín Zamora; 2 males, cb. 24.4, 19.0 mm, cl. 20.5, 15.8 mm.—Rio Cesar, 10 km S Valledupar, Depto. Magdalena; 25 Jan 1968; Agustín Zamora; 4 males, cb. 20.0, 17.4, 16.4, 12.6 mm; cl. 16.9, 15.5, 14.8, 11.5 mm; three females, cb. 19.7, 18.5, 12.8 mm, cl. 17.2, 15.7, 11.7 mm.—Rio Sevilla, Santa Marta, Depto. Magdalena; 15 Nov 1967; Agustín Zamora; 1 male, cb. 21.5 mm, cl. 18.9 mm, 2 females, cb. 18.2, 15.2 mm, cl. 16.2, 13.4 mm.—Rio Gaira, near Santa Marta, Depto. Magdalena; 15 Nov 1967; Agustín Zamora; 1 male, cb. 21.3 mm, cl. 18.4 mm, 1 female, cb. 15.0 mm, cl. 13.7 mm. —Quebrado Matogiro, Finca "El Aranar", near Bonda, Depto. Magdalena; 14 July 1964; F. Medem and C. Velásquez; 1 male, cb. 19.0 mm, cl. 16.9 mm, (TU-4865).—Rio Aracataca, near Santa Marta, Depto. Magdalena; 9 Nov 1967; Agustín Zamora; 1 male, 1 female, 3 juveniles. —Cartegena, Depto. Bolivar; 11 Aug 1969; collector unknown, received from M. D. Little; 1 male, cb. 23.0 mm, cl. 20.0 mm, (TU-6190).

Type and Distribution: The holotype is a female from the Rio Escondido, near Rama, 50 miles from Bluefields, Nicaragua. The species has been reported since from Ibague, near Tolima, Colombia (Doflein, 1899), from Santa Marta, Colombia (Pearse, 1921), and from Barranquilla, Colombia (Zimmer, 1912). In Colombia, the species seems to be restricted to the Magdalena Valley. The disjunct distribution of this species in Nicaragua and Colombia is unusual when compared with the distribution of other species of the family. Unfortunately, the only known Nicaraguan specimen is a female; however, the suborbital margin is very distinctive in this species, and in our opinion the similarity of the Nicaraguan holotype to the Colombian specimens is sufficiently close to confirm the

conclusion of previous workers that they are the same species.

Sylviocarcinus torresi (Pretzmann, 1968)

Figs. 3 and 4

Valdivia (*Valdivia*) *torresi* Pretzmann, 1968b, p. 72.

Description: Carapace regularly convex in both directions; regions poorly marked. Margin of front straight or slightly concave; upper surface not curving downward. Anterolateral margin of carapace with five teeth including orbital. Orbital tooth wide, pointed, external border straight or slightly convex. Second to fourth teeth wide, well developed, regularly spaced. Fifth tooth located slightly behind middle of carapace, small, sometimes rudimentary, widely separated from fourth tooth. Lateroposterior margin of carapace with thin carina. Lower orbital margin with seven or eight regularly spaced papillae. Crest of antero-buccal angle with internal tooth followed by two or three small papillae.

Chelipeds unequal; distal corner of upper border of merus and middle of lower border of merus each bearing spine; lateral border produced in sharp tooth; internal border of carpus with single spine. Upper and lower margins of dactylus and propodus of ambulatory legs very setose. Third to fifth abdominal segments fused in both sexes.

Gonopod with double or bicarinate lateral lobe. Aperture at terminus of margin lateral, not at tip.

Surface of carapace and most surface of pereiopods covered by small granules visible to naked eye.

Color: The specimens preserved in alcohol have a deep brown carapace with small lighter spots.

Material Examined: Colombia: Rio Fundacion, near Santa Marta, Depto. Magdalena; 25 January 1968; Agustín Zamora; 2 males, 1 female.—Rio Cesar, 10 km S Valledupar, Depto. Magdalena; 25 January 1968; Agustín Zamora; 2 males, 1 spent female, 1 immature female.—Rio Aracataca, near Santa Marta, Depto. Magdalena; 16 November 1967; Agustín Zamora; 7 young males, 3 young females.—Rio Sevilla, near Santa Marta; 15 November 1967; Agustín Zamora; 1 young female.

Type and Distribution: The holotype is a male from La Regla, Depto. Bolivar, Colombia. The species is restricted to the Santa Marta region and the drainage of the Rio Magdalena.

Table 1. Measurements of *Valdivia torresi.*

	cl.	Anterior cb.	Posterior cb.	fow.
		Rio Fundacion		
Male	51.5	53.5	52.0	34.2
Male	53.0	54.8	53.8	37.0
Female	51.8	54.3	52.5	34.9
		Rio Cesar		
Male	50.8	52.0	51.0	35.0
Male	44.8	47.0	46.5	31.8
Female	45.2	48.0	46.0	31.3
Female	30.0	31.3	29.9	22.0
		Rio Aracutaca		
Male	27.4	30.5	29.7	21.0
Female	23.4	25.2	24.4	17.8
Male	20.0	21.2	20.2	15.6
Male	18.5	19.0	18.6	14.3
Male	14.6	15.1	14.5	11.9

Remarks: In the young specimens (up to 32.5 mm carapace width), the teeth of the anterolateral border of the carapace are slender and sharp, with the borders serrated. The margin of the front is lined with round granules, and the upper surface of the front is conspicuously excavated. In the smaller specimens (cb. 23 mm) the merus has two small sharp spines on the lateral border, in addition to the tooth located distally. These spines are sometimes represented in adults by one or two tubercles. The carapace of younger specimens are flatter and more irregular than in the older crabs.

Valdivia torresi is also very close to *V. piriformis* Pretzmann. Juvenile specimens are almost impossible to separate, except by the collection locality. However, in older specimens of *V. piriformis* the lateral walls of the carapace become swollen, giving the body a pear-shaped appearance. In *V. torresi* the anterior portion of the carapace is always wider than the posterior portion (Table 1); this species does not seem to attain the very large size of *V. piriformis.* Bott (1969, p. 38) suggests that *Valdivia torresi* and *V. piriformis* are both synonyms of *Valdivia* (*Forsteria*) *venezuelensis edentata.* However, the gonopods are of such a different shape that we do not think they are related.

Sylviocarcinus piriformis
(Pretzmann, 1968)
Fig. 5

Valdivia (*Valdivia*) *piriformis* Pretzmann, 1968b, p. 73; Schmitt, 1969, p. 98, Fig. 3, a–e, f–i.

Description: Carapace moderately convex in specimens up to 32 mm carapace length; more strongly convex in larger specimens. Carapace subquadrate in smaller specimens, widest between third or fourth pair of teeth, anterior to middle of carapace; in larger specimens becoming subquadrate to piriform, widest behind fourth lateral tooth, posterior to middle of carapace due to swelling of lateral wall of branchial chamber; finally in largest specimens becoming orbicular with posterior lateral walls considerably swollen. In small specimens, anterolateral teeth of carapace four to five, including orbital, fifth rudimentary when present, others prominent with slender tips. In large specimens (42 to 73 mm carapace length) four to five anterolateral teeth including orbital, orbital small, well-defined, sharply pointed, remaining teeth blunt, low, sometimes reduced to swelling with small papilla; in largest specimens (74.8 and 78.8 mm carapace length) becoming obsolete or represented by a small round papilla. Margin of front slightly concave; lower margin of orbit with large internal tooth, followed by usually nine tubercles, diminishing in size externally; anterolateral buccal angle bearing internal triangular tooth followed externally by three of four small tubercles.

Chelae moderately unequal in small specimens, becoming very unequal with increasing size; in largest specimen, major chela exceeding width of carapace by almost entire length of ischium; length of largest palm 1.3 length of carapace.

Third to fifth abdominal segments fused in both male and female.

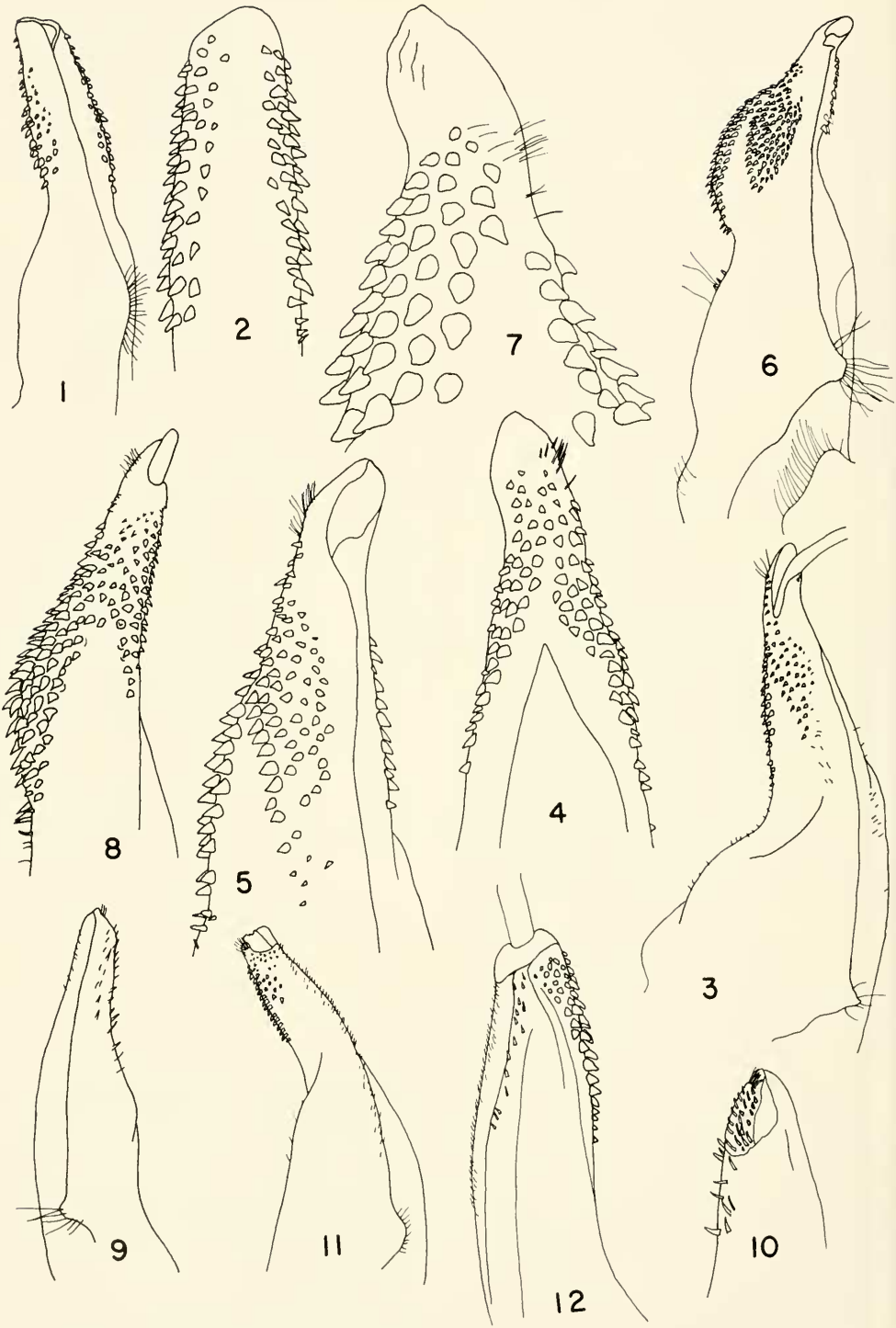
First gonopod curving slightly mesiad; margin almost straight; prominence bearing marginal setae very pronounced, somewhat angular in outline. Gonopod bearing three spine fields, one on either side of margin, a third on mesial edge, the three fields coalescing near tip.

Size: Measurements of *Sylviocarcinus piriformis* are given in Table 2.

Table 2. Measurements of *Valdivia piriformis*.

	cl.	Anterior cb.	Posterior cb.	fow.
		Isiro Dam		
Male	78.8	77.7	83.7	55.4
Male	72.5	71.0	74.8	51.4
		Rio Guasare		
Male	74.8	76.8	80.8	55.1
		Rio Negro Machiques		
Male	29.9	33.4	31.5	23.4
Female	27.5	30.4	28.8	21.6
Female	25.8	27.4	26.5	20.3
Female	17.9	19.7	18.8	15.0
Female	13.5	14.6	14.0	11.5
		Rio Negro Tokio		
Male	43.7	43.5	44.2	32.4
		Mene Grande		
Male	31.6	34.0	32.0	25.4
Female	28.0	30.5	28.8	22.5
Female	28.7	31.4	29.0	23.2
Male	25.8	27.1	26.5	20.7
Female	24.8	27.6	25.7	19.8
Male	24.4	26.4	25.0	19.8
Male	17.0	18.6	17.7	14.4
		Chipuen		
Male	32.2	34.3	34.3	25.0
Male	28.5	31.0	29.9	22.8
Female	25.0	29.7	28.3	21.6
Male	25.2	26.8	26.1	20.7
		Rio Buena Vista		
Female	26.4	27.7	26.8	19.7
		Rio Onia		
Male	19.3	20.9	19.5	15.9

Material Examined: Venezuela: Isiro Dam, Estado de Falcon; J. Aguirre; 2 males.—10 km south of Mene Grande, Estado de Zulia; 23 February 1968; G. Rodriguez; 4 males, 4 females.—Quebrada Chipuen, near Valera, 350 m altitude, Estado de Trujillo; 14 February 1966; G. Rodriguez; 3 males, 1 female.—Rio Buena Vista, near the town of Buena Vista, 150 m altitude, Estado de Trujillo; 14 February 1966; G. Rodriguez; 1 female.—Rio Onia, tributary of Rio Escalante, near El Vigia, Estado de Merida; 23 April 1964; F. Mago; 1 male (MB).—Rio Negro, south of Machiques, Estado de Zulia; 8 April 1966; J. Ewald; 1 male, 4 females.—Rio Negro, Todio, 16 km west of Machiques, 280 m altitude, Estado de Zulia; 3 January 1950; F. Mar-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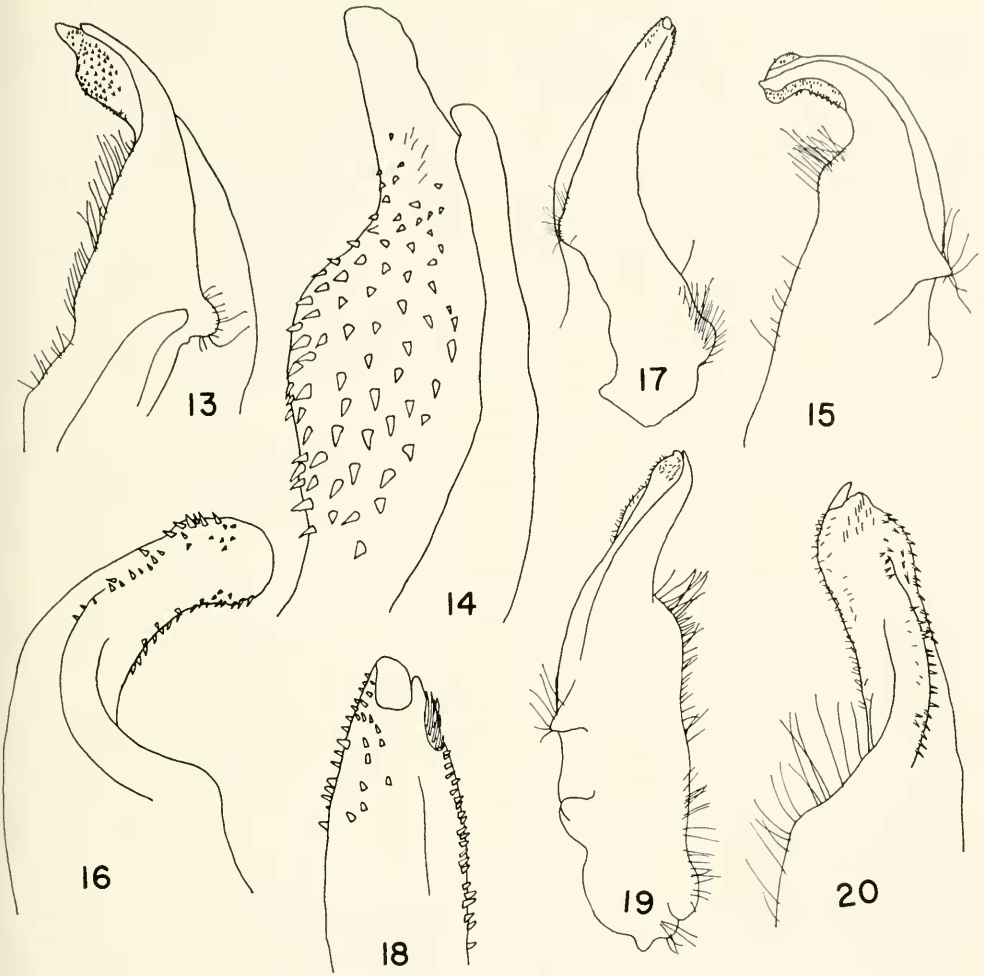


Figures 1–20. Right gonopod (Figs. 1–16) and left gonopod (Figs. 17–20) of Trichodactylidae. 1–2, *Trichodactylus quinquedentatus*; 3–4, *Sylviocarcinus torresi*; 5, *S. piriformis*; 6–7, *S. gigas*; 8, *S. pictus*; 9–10, *Zilchiopsis ecuadoriensis*; 11–12, *Valdivia serrata*; 13–14, *V. venezuelensis*; 15–16, *Dilocarcinus niceforei*; 17–18, *D. dentatus*; 19–20, *D. medemi*.

tin; 1 male (LS 66). Colombia: Cucuta, Norte de Santander; July 1941; Br. Niceforo; 2 males, 2 females; USNM 125412–125415.—Rio Sardinata, Norte de Santander; July 1947; Br. Niceforo; 2 males; USNM 125416–125417.—same locality; July 1941; Br. Niceforo; 1 male; USNM 125416; Puerto Santander, Norte de Santander; July 1947; Br. Niceforo; 1 female; USNM 125419.—Colombia, exact locality unknown; Br. Niceforo; 2 females; USNM 125410–125411.

Type and Distribution: The holotype is a male (cl. 48 mm) from Cucuta, Colombia. Our records show that this species is restricted to the Maracaibo depression.

Remarks: Bott (1969) suggests that *S. torresi* and *S. piriformis* are related to *Valdivia venezuelensis*; they are, however, distinct from the latter species.

The gonopods of *piriformis* and *torresi* are similar, except that in *torresi*, the lateral edge is straighter, and the spines of the caudal field sparser. The margin of *S. torresi* is somewhat more curved, and the prominence bearing the marginal setae is more triangular than that of *S. piriformis*. The cephalo-mesial angle of the gonopod of *S. piriformis* bears a small accessory tuft of spines proximal to

the large spine field; these spines are absent in *S. torresi.*

Sylviocarcinus ***gigas*** new species

Figs. 6–7, 21–22

Description: Carapace strongly arched toward front, sides curving down abruptly; slight downward curve posteriorly, large flat area in central posterior portion. Frontal margin of carapace gently bilobed, bearing 13 to 19 spines, quadrangular in shape; inconspicuous fissure in margin of carapace behind orbit. Outer orbital angle varying from rounded, blunt to distinctly spiniform. Anterolateral margin of carapace with 4 to 5 teeth including orbital; low round process between orbital and second tooth; in most specimens having 4 teeth, tubercle between third and fourth. Ventral border of orbit tuberculate, spine at inside corner. Anterolateral buccal angle bearing two spines, sharp in small specimens, blunt in larger specimens.

Inner borders of merus of third maxilliped strongly divergent, outer borders nearly straight; exopod long, about half length of merus; outer anterior border of merus carinate; tip notched at point of insertion of palp.

Anterior dorsal border of propodus of chelipeds with single spine near inner part of insertion of dactylus; each side of propodus with small tubercle at insertion of dactylus. Upper inner border of carpus with large spine. Upper and lower outer corners of merus bearing spines; lower inner border of merus with blunt spine about one-third distance from proximal articulation.

Third to fifth abdominal segments fused in male and female.

First male gonopod curving slightly mesiad with rounded tip abruptly bent mesiad at about forty-five degree angle. Lateral surface with prominent swelling, armed with heavy spines, divided by groove without spines; mesial surface with smaller patch of spines. Caudal surface flat, mostly without spines. Marginal process round, well defined.

Size: Largest male, 88.2–81.8–53.4–35.8 (the largest known specimen of Trichodactylidae); smallest male without carapace teeth, 72.1–65.6–44.8–28.5; largest female, 65.7–61.8–39.5–26.4; smallest specimen (a male, still recognizable from the gonopods as belonging to this species), 32.5–29.5–21.5–13.5. The front of this species is difficult to define, since it curves gradually into the posterior margin of the orbit; the distance measured is between the highest points of the postorbital elevation which is always present just lateral to the frontal tubercles and mesiad from the single postorbital fissure.

Material Examined: Colombia: Rio Orteguaza near Venecia, Amazon drainage, Depto. Caqueta; March 1966; collector unknown, received from Dr. M. D. Little; 13 males, 10 females, including the holotype.—Rio Putumayo at Puerto Asis, Amazon drainage, Depto. Putumayo; 18 July 1969; collector unknown, received from Dr. M. D. Little, 1 male.

Type and Distribution: The holotype (USNM-139120) and 11 male and 9 female paratypes (USNM-139121) have been deposited in the United States National Museum. Two males and one female paratype (TU-6187, TU-5342) have been deposited in the Tulane University collections.

Sylviocarcinus gigas has been found on the eastern slopes of the Andes in the Amazon drainage of Colombia.

Remarks: In this species, there is a distinct tendency for all spines and teeth to become blunt and low in larger specimens. Spination of the carapace and chelae is taken from large males, but in the extraordinarily large holotype (carapace length 81.8 mm), the carapace teeth have disappeared altogether, leaving only very low tubercles.

Sylviocarcinus gigas can be distinguished by the prominent protuberance on the lateral surface of the gonopod. The general curvature of the gonopod and the distribution of the heavy spines is similar to *S. torresi* and *S. piriformis.*

Sylviocarcinus pictus

(H. Milne Edwards, 1853)

Fig. 8

Dilocarcinus pictus H. Milne Edwards, 1853, p. 216.

Orthostoma pictum. Ortmann, 1897, p. 327, 328.

Trichodactylus (*Dilocarcinus*) *pictus.* Rathbun, 1906, p. 62, Pl. XIV, Fig. 9.

Holthuisia picta. Pretzmann, 1968b, p. 74.

Sylviocarcinus pictus pictus. Bott, 1969, p. 31, Pl. 12, fig. 22a, b, Pl. 21, fig. 53.

Description: Carapace regularly convex in both directions, front deeply bilobed. Anterolateral border of carapace bearing five to six teeth, including orbital; orbital tooth sharp, hooked, well-developed. Lower orbital border with three to four well developed spines medially, decreasing in size laterally, followed laterally by four tubercles. Anterolateral buccal angle with two well-developed, sharp spines.

Major chela very slender, dactylus slightly longer than palm, length of dactylus 5.5 times greatest width. Merus with tooth midway on inner border, strong tooth near tip of upper border; propodus with blunt distal tooth on upper border.

Third to fifth abdominal segments of male fused; abdomen of male with pair of round swellings between third and fourth segments.

First male gonopod with straight margin; prominence bearing marginal setae a gentle curve; lateral edge (viewed posteriorly) with curve at about two-fifths length of gonopod from base forming slight constriction; followed by strong outward curve, with slender tip. Single patch of heavy spines, extending proximally on lateral edge; very small patch of distal, lateral setae. Second gonopod much longer than first, with spade-shaped tip.

Color: Carapace and chelae covered with red spots and rings 1–2 mm in diameter, persistent in alcohol.

Material Examined: Colombia: Leticia, on the Amazon River, Depto. Amazonas; Brother Niceforo; 1 male, cb. 46.9 mm, cl. 40.5 mm, fow. 32.5 mm (MLaS).—Rio Arara, Leticia, Depto. Amazonas; 22 Aug 1969; collector unknown, received from Dr. M. D. Little; 1 male, cb. 41.2 mm, cl. 38.2 mm, fow. 32.9 mm, ft. 20.1 (TU-6189).

Type and Distribution: The types are two females from Loreto, Amazonas, Colombia. Rathbun (1906) added several specimens from French Guiana, the Amazon Basin (Nauta, Peru; Manaos, Villa Bella, and Pihauhy, Brazil) and the Paraguay River.

Remarks: Pretzmann (1968b) has described two subspecies, *S. picta rionegrensis*, and *S. picta collastinensis*. The latter name is probably derived from the city of Clatine, formerly called Collatina, Estado do Espiritu Santo, Brazil. Both these subspecies are apparently based on single specimens, one a female, the other a small male, and it is therefore not possible to form an opinion as to their validity.

Bott (1969) includes *Dilocarcinus margaritifrons* Ortmann, 1893 and *Trichodactylus* (*Valdivia*) *oronensis* Pretzmann, 1968, as well as both of the aforementioned new subspecies of Pretzmann, within *Sylviocarcinus pictus pictus*, and reduces *Dilocarcinus pardalinus* Gerstacker, 1856 to a subspecies of *S. pictus*. In our opinion, none of the students of the Trichodactylidae has adequately defined the varied populations of this species, most of which fall outside of our geographical boundaries.

Zilchiopsis ecuadoriensis
(Pretzmann, 1968)
Figs. 9 and 10

Trichodactylus (*Valdivia*) *ecuadoriensis* Pretzmann, 1968a, p. 3.

Valdivia (*Valdivia*) *ecuadoriensis*, Pretzmann, 1968b, p. 71.

Description: Carapace convex anteriorly; post-frontal lobes and gastric region considerably elevated over hepatic and frontal regions; posterior part of carapace flatter, surface less sculptured. Front strongly bilobed; space between lobes rounded or almost straight; under microscope margin of front marked by tuberculate ridge. Anterolateral border of carapace bearing two sharp teeth behind orbital; behind second tooth a rudimentary third tooth or low lobe. Orbital tooth wide, blunt, external margin concave in one specimen, slightly convex in another specimen.

Internal angle or lower orbital margin with wide round tooth, followed by smaller papillae diminishing in size toward external angle; anterolateral buccal angle with ridge, without teeth or spines.

Chelae moderately unequal; ischium without spines; merus with sharp spine midway on internal margin; lateral and internal borders unarmed; internal border of carpus with single spine; palm of chela with small terminal spine on upper margin. Third to sixth abdominal segments fused in both male and female.

First male gonopod curving slightly laterad, becoming narrow about two-thirds distance from base to tip; small scattered spines at tip, longest on lateral edge; distinct patch of small lateral teeth at tip; second gonopod about same length as first.

Material Examined: Ecuador: Loreto, Napo-Pastaza Province, foothills of Mt. Sumaco, 450 m altitude; June 1968; coll. Manuel Olalla; 2 males, cb. 20.5, 19.2 mm, cl. 18.5, 19.2 mm, fow. 15.7, 14.3 mm, 1 spent female, cb. 23.8 mm, cl. 21.0 mm, fow. 16.6 mm.

Type and Distribution: The holotype and only specimen reported in the literature is a male from Payamino, Napo-Pastaza Province, Ecuador.

Remarks: Bott considers *Valdivia ecuadoriensis* Pretzmann a synonym of *Zilchiopsis emarginatus* (H. Milne Edwards, 1853). However, the gonopod of our specimens is completely different from the holotype of *Z. emarginatus*, and does not resemble any of the species examined by Bott. In accordance with Bott's classification and key, we place Pretzmann's species in *Zilchiopsis*.

Valdivia serrata White, 1847

Figs. 11 and 12

Valdivia serrata White, 1847, p. 31.

Trichodactylus (*Valdivia*) *serrata.* Rathbun, 1906, p. 49, Pl. XVII, Fig. 4; Coifmann, 1939, p. 94; Holthuis, 1959, p. 210.

Valdivia (*Valdivia*) *serrata.* Pretzmann, 1968b, p. 72; Schmitt, 1969, p. 98, Fig. 2, a–e.

V. (*V.*) *serrata serrata.* Bott, 1969, p. 39; Pl. 6, Fig. 11a; Pl. 19, Fig. 41; Text Fig. 1, p. 11.

Description: Anterolateral buccal angle without teeth or spines, bearing indistinct tubercles.

Third to fifth segments of abdomen of male and female fused.

Gonopod margin and tip curved laterad, twisting slightly so that when marginal surface is viewed, margin disappears behind medial side; gonopod narrowing at tip; strong lateral patch of spines, fine setae on mesial surface; small lateral apical tuft of setae, directed apically; prominence bearing marginal setae well marked.

Description, including color, otherwise as in Rathbun (1906), Holthuis (1959), and Bott (1969).

Material Examined: Venezuela: Alto Caño Rueda, Atures, 22 km from Puerto Ayacucho, Territorio Amazonas; 30 October 1965, Pablo Anduze; 1 male, cb. 36.5 mm, cl. 32.0 mm (MB).—Costa de Iguapo, Cano Iguap. Territorio Amazonas, 450 m altitude; 1 March 1968; Juan A. Rivero; 1 female, cb. 37.4 mm, cl. 33.7 mm. Ecuador: Loreto, foothills of Mount Sumaco, Provincia Napo, 450 m altitude; June 1968; Manuel Olalla; 2 males, cb. 44.0, 37.9 mm, cl. 39.2, 33.6 mm. Colombia: Rio Orteguazá near Venecia, Caquetá, Amazon drainage; March 1966; collector unknown, received from Dr. M. D. Little; one male (40.6–35.2–25.3–13.8) (TU-6092).—Puerto Limón, Rio Caquetá, Amazon drainage, Depto. Putumayo; 17 August 1968; collector unknown, received from Dr. M. D. Little; one male (43.7–37.7–25.8–14.8) (TU-6179).—Rio Arara, Leticia, Depto. Amazonas; 22 August 1969; collector unknown, received from Dr. M. D. Little; 2 males (56.4, 41.8–48.4, 36.1–33.3, 25.8–18.4, 15.0) (TU-6188).

Type and Distribution: The type locality of *Valdivia serrata* is unknown; it has a wide distribution in the Amazon drainages of Venezuela, Colombia, and Ecuador, as well as the Guianas and Brazil.

Remarks: Pretzmann described two new subspecies of *V. serrata.* Bott described two new subspecies, and in addition considered *Sylviocarcinus latidens* A. Milne Edwards, 1869, to be a subspecies of *V. serrata.* All of our specimens are placed under *Valdivia serrata*, because of the undoubted variability of the species, and because there does not appear to be sufficient material available to adequately support the proposed classification.

Valdivia venezuelensis Rathbun, 1906

Figs. 13 and 14

Trichodactylus (*Valdivia*) *venezuelensis* Rathbun, 1906, p. 47, Pl. XVII, Fig. 10.

Holthuisia venezuelensis. Pretzmann, 1968b, p. 74.

Valdivia (*Forsteria*) *venezuelensis venezuelensis.* Bott, 1969, p. 37, Pl. 5, Figs. 9a, b.

Valdivia (*Forsteria*) *venezuelensis edentata* Bott, 1969, p. 38, Pl. VI, Figs. 10a, b, Pl. XIX, Fig. 40.

Trichodactylus (*Valdivia*) *ornatifrons* Pretzmann, 1968, p. 3.

Valdivia (*Valdivia*) *ornatifrons.* Pretzmann, 1968a, p. 71.

Description: Margin of front straight, tuberculate; anterolateral border of carapace with four teeth, including orbital, decreasing in size posteriorly. In large males, carapace teeth become smooth tubercles. Inferior orbital margin with large, blunt tooth on internal angle; rest of margin with blunt

teeth or tubercles; crest of anterolateral buccal angle with poorly defined tubercles.

Chelipeds strongly unequal. Upper border of merus with sharp well-defined spine, in some specimens becoming small or obsolete; inferior internal margin with sharp spine or tubercle. Upper interior margin of carpus with blunt tooth. Chela deep, flattened laterally; in large males, gaping with propodus extending beyond dactylus, strongly hooked at tip.

Third to fifth abdominal segments fused in both male and female. Proximal margin of telson distinctly narrower than distal margin of sixth abdominal segment.

First gonopod of male very broad at base, narrowing abruptly to constriction about two-thirds distance from base to tip; margin and tip curving laterad, margin twisting in mesial direction, emerging at tip on anterior surface; strong lateral protuberance near tip, bearing heavy spines; marginal process bearing setae very conspicuous, well-defined; lateral surface heavily setose on proximal two-thirds. Second gonopod about same length as first.

Remarks: Examination of a large series of specimens from the type locality of *Valdivia ornatifrons* Pretzmann shows that this species is not distinguishable from *Valdivia venezuelensis*, and is based on characters which fall within the range of variation of the latter species.

Valdivia (*Forsteria*) *venezuelensis edentata* Bott, 1969, is based on a large male of *Valdivia venezuelensis*. The peculiar shape of the major chelae and absence of teeth on the anterolateral margin of the carapace is a normal condition of large males of this species. The type locality is given only as "Bolivia". We are of the opinion that this is an error for "Bolivar", a state in Venezuela.

Color: Carapace and pereiopods covered with small, irregular red spots, becoming smaller and more numerous on the H-shaped depression in the gastric region of the carapace, and the cardiac region, and larger and sparser on the major chelae. The chelae in large males becomes white and devoid of spots except on the dorsal edge of the propodus.

Size: Largest male; 47.7–45.4–32.8–21.2. Smallest male without carapace teeth; 34.4–32.1–24.9–16.5 (the major chela was missing in this specimen, but was probably not of the "large male" configuration): largest female; 49.1–44.4–31.7–21.1.

Material Examined: Venezuela: Paraima, Estado de Guarico; 31 March 1950; 1 ovig. female (MB).—Rio Carmen de Cura, 5 km SW of the town of Carmen de Cura, Estado de Aragua; 6 April 1955; F. Martin; 1 immature female (LS 470).—Rio Cura, near the town of Carmen de Cura, Estado de Aragua; 12 February 1954; C. J. Rosales; 1 male (LS 515).—Rio Taguay, Estado de Aragua; 12 December 1967; Juan Pulido; 3 males, 1 spent female; 1 young female.—Cano Los Caballos, Rio Orinoco, Estado de Bolivar; 26 December 1949; A. Maurois; 2 ovigerous females (LS 53).—Rio Chiviripa, between La Urbana and Caicara, Estado Monagas; April 1958; G. Medina; 1 spent female (MB).—Venezuela (without other data); 1 spent female.—Rio Guarapiche, Caicara, Estado Monagas; June 1952; coll., F. D. Smith; 1 male (USNM-119882).—Same locality; 28 males, 22 females, one ovigerous (the largest female).

Type and Distribution: Rathbun designated two females from the Orinoco River as cotypes. She added two males and some immature females from a tributary of the Apure near the Venezuelan Andes, and a female from the Venezuelan "llanos". From our records the species seems to be distributed widely in the Venezuelan llanos, and throughout the Orinoco River basin.

Dilocarcinus (*Dilocarcinus*) *niceforei* (Schmitt and Pretzmann, 1968)

Figs. 15 and 16

Trichodactylus (*Valdivia*) *niceforei* Schmitt and Pretzmann, 1968, p. 6.

Valdivia (*Rotundovaldivia*) *niceforei*, Pretzmann, 1968b, p. 73; Schmitt, 1969, p. 93, Fig. 1.

Valdivia (*Rotundovaldivia*) *niceforei cucutensis* Pretzmann, 1968b, p. 73.

Description: Carapace very convex anteriorly-posteriorly, moderately convex laterally; surface with deep impressions or sulci. H-shaped depression of cardiac region poorly marked. Surface covered with small papillae, closely spaced, barely visible to naked eye; also large punctae. Front strongly bilobed, space between lobes bearing two to five median teeth, with additional small projections or papillae; holotype with two teeth; holotype of *V. n. cucutensis* with eight teeth.

Anterolateral border of carapace with eight spines including orbital; gap between first

and second teeth larger than rest; in *V. n. cucutensis* orbital tooth slender, sharp; in remaining specimens sharp to blunt. Inferior margin of orbit with 5 to 8 spines, diminishing in size laterally. Crest of anterolateral buccal angle with 5 or 6 spines.

All abdominal segments free in both males and females.

Lower margin of ischium with large spine in smaller specimens; lower margin of merus with three median and one terminal spine; internal margin with one median spine; upper margin with one distal spine. Carpus with large spine on internal margin; smaller spines on external and upper margins near articulation of palm. Upper border of propodus with small spine near articulation of dactylus. Ischium spine absent in larger specimens; spines on lower margin of carpus become small papillae, terminal spine becomes triangular tooth; spines of outer and upper margins of carpus and upper border of merus become ill-defined tubercles.

Base of gonopod broad, curving very strongly laterad, just distal to abrupt narrowing of broad base. Projection bearing marginal setae prominent, sharp. Tip of gonopod with rounded expansion; distal part bearing lateral and mesial row of prominent spines, recurved at different angles, irregular in appearance.

Material Examined: Venezuela: Rio El Quebradon, near Aguas Calientes, Estado de Zulia; 7 May 1965; F. Majo; 1 male (MB). Colombia: Cucutá, Norte de Santander; collection dates unknown; Br. Niceforo Maria; 3 males, 3 females; USNM 125400, 125401, 125402, 125403, 125404, 125117.

Type and Distribution: The holotype and only specimen of *Valdivia niceforei niceforei* previously reported is a male from Pamplona, Colombia. The holotype and only specimen of *Valdivia niceforei cucutensis* is a male from Cucutá, Colombia. The city of Pamplona is located 2500 m above sea level. Since Trichodactylidae are normally found at altitudes below 500 m, we assume that the crabs were collected in or near the Rio Pamplona, near the city. Since Pamplona and Cucutá are located only 50 km apart, and only two specimens from the region were examined, we do not recognize the subspecific status of these specimens. Schmitt (1969, p. 68) comes to the same conclusion.

The Rio Pamplonita drains into Lake Maracaibo through the Rio Catatumbo. The Venezuelan material comes from small creeks which also drain into Lake Maracaibo; therefore, it appears that the species is restricted to the Lake Maracaibo drainage.

Dilocarcinus dentatus (Randall, 1839)

Figs. 17 and 18

Orthostoma dentata Randall, 1839, p. 122, Pl. V, Figs. 1, 3.

Trichodactylus (*Dilocarcinus*) *dentatus.* Rathbun, 1906, p. 65, Pl. XVIII, Fig. 4; Holthuis, 1959, p. 414, Figs. 50, 51; Chace and Hobbs, 1969, p. 152, Fig. 44.

Dilocarcinus dentatus. Pretzmann, 1968b, p. 75.

Poppiana dentata. Bott, 1969, Pl. 11, Figs. a, b, Pl. 20, Fig. 50.

Description: Carapace very convex in both directions; front bilobed, armed with 16 to 21 small spines; anterolateral margin of carapace bearing 10 small, close-set teeth including orbital (9 in one female from Calabozo); gap between second and third tooth greater than between other teeth. In some males, teeth may become semicircular lobes. Inferior orbital border armed with 7 to 11, usually 9, spines, buccal crest armed with 5 to 8, usually 6, spines. Carapace covered with numerous small, approximately circular elevations.

Internal angle of merus of chelipeds with strong tooth; dorsal and ventral angles with small, sharp, distal spines. Carpus with very large spine on inner border. Upper border of propodus with small sharp spine or tubercle.

Abdominal segments 4–6 fused in both male and female.

First male gonopod curving slightly laterad; margin emerging on anterior surface; prominence bearing marginal setae poorly marked, but setae long and conspicuous. Lateral teeth at tip sparse and moderate in size; mesial teeth denser, smaller; strong distal tuft of setae near tip on mesial surface, emerging from a small pit.

Color: The small protuberances of the carapace seen under the microscope, are colored red to dark brown. In life the color appears to be light brown or cream colored.

Size: Measurements of five males from Caicara are as follows: cb., 56.5, 46.0, 45.1, 44.4, 43.7; cl., 45.8, 35.9, 35.7, 35.8, 35.0; fow., 34.4, 28.1, 28.0, 28.2, 27.9; ft., 22.3, 18.2, 17.9, 17.1, 17.1.

Material Examined: Venezuela: Rio Aro, La Aparicion, Estado de Portuguesa; 29 August 1955; Fmx. Martin; 1 female (LS).—Hacienda La Herreria, La Aparicion, Estado de Portuguesa; 22 August 1955; 3 males.—Quebrada Caramacata, 2 km N Apartaderos, Estado de Cojedes; 17 October 1949; L. Ciferri; 1 male, 2 females.—Naguanagua, near Valencia, Estado de Carabobo; 7 November 1965; F. Rumbos; 1 male.—East of San Fernando de Apure. Estado de Apure; 20 June 1951; L. Rivas; 1 female (LS 334).—Hato Piritu, Calabozo, Estado de Guárico; 100 m altitude; 2 January 1963; F. Tamayo; 2 males, 1 with carapace broken, 1 female.—Rio Guárico, 6 km from El Sobrero, Estado de Guárico; A. Fernandez-Yepez; 2 males, 5 females (LS 42).—Espino, Estado de Guárico; L. Klisans; 1 female, 1 immature male. —24 km SSE Calabozo on road to Cazorla, Estado de Guárico; 27 Nov 1966; N. R. Foster, J. S. Ramsey, E. Hoigne; 3 males, 2 females (TU-6220).—Temporary pond 18 km SSE Calabozo on road to Cazorla, Estado de Guárico; 27 Nov 1966; N. R. Foster, J. S. Ramsey; E. Hoigne; 1 male, 1 female (TU-6221).—Quebrado Barbacoas, Estado de Aragua; 12 September 1967; Juan Pulido; 1 female.—Pardillal, Estado de Guárico; October 1952; 1 female (MB).—Isla Chivera, Delta del Orinoco, Territorio Delta Amacuro; 15 December 1952; L. Pojan; 1 male (LS 297).—Cano Onoto, El Callao, Estado de Bolivar; 1 male, 1 female.—Rio Guarapiche, near Caicara, Estado Monagas; 8 September 1968; A. E. Esteves; 5 males.

Type and Distribution: The type specimens are three males and one female from an unknown locality. Holthuis (1959) restricted the type locality to Paramaribo, Surinam. Pretzmann (1968b) described two subspecies, *D. d. cayennensis* from Cayenne, and *D. d. trinidadensis* from Trinidad.

Dilocarcinus (*Dilocarcinus*) ***medemi*** new species

Figs. 19–20, 23

Description: Carapace strongly arched anteriorly and posteriorly, moderately arched laterally; surface finely granulated. Anterior border of front bearing 13 spines (two broken in holotype); suborbital margin of holotype bearing seven spines on each side; paratype with six on each side; buccal crest with five spines; anterolateral border of carapace with eight spines including the orbital. All spines sharp, conical; no gradation into tubercles.

Major chela with alternating large and small teeth on cutting edge of propodus and dactylus; proximal tooth of dactylus large, small tooth just inside large terminal tooth. Propodus bearing dorsal spine at base of dactylus. Distal part of carpus bearing three dorsal spines, median and outer spines small, inner spine very long, curved outward. Merus with long, slender, curved dorsal spine; outer margin with three small, sharp spines (two in paratype), with small tubercle proximal to spines, grouped near center of merus; inner ventral angle with large spine in center, small spine at anterior corner.

Abdominal segments 3–6 fused in male, sides of abdomen curved, narrowing along segments 5–6, broadening at fusion of segment 6 and telson; sides of telson slightly concave.

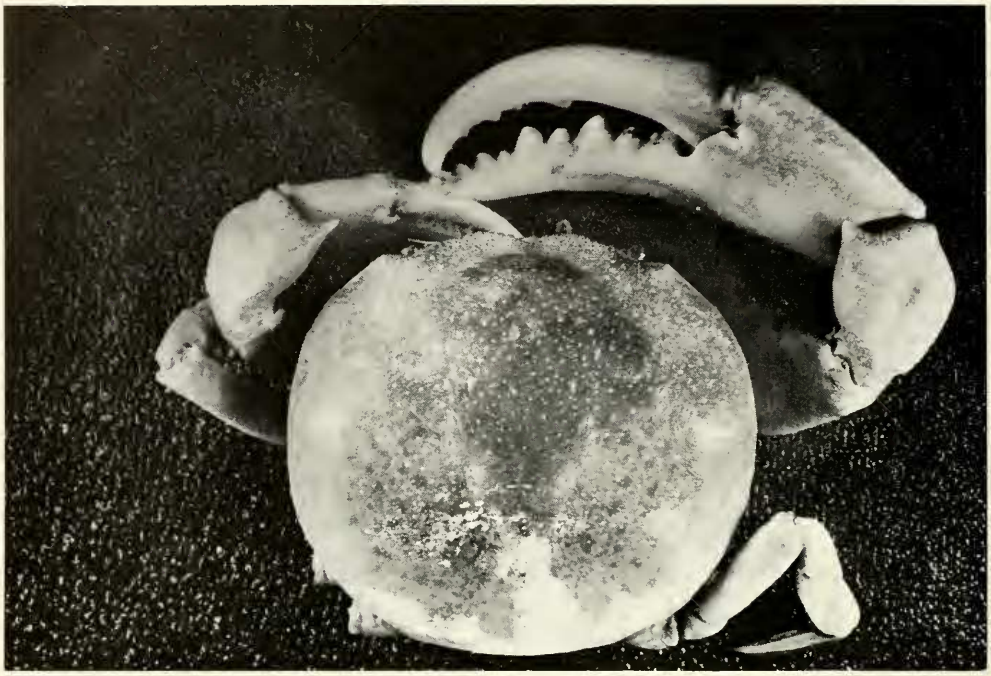
Gonopod curving slightly laterad, narrowing abruptly at about midpoint of distal segment of gonopod; sides nearly parallel in distal portion, with slight expansion at tip. Distal spines small, conical; no apical tuft of setae. Lateral process at tip hook-shaped, slightly exceeding mesial process.

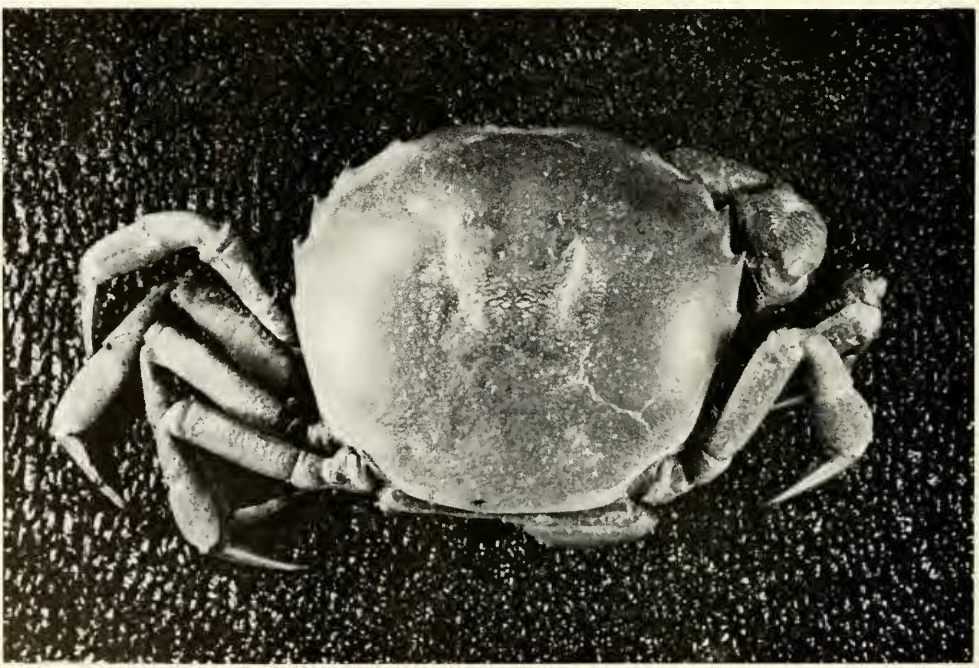
Size: Holotype: cb. 39.0 mm; cl. 31.0 mm; fow., 24.6 mm; ft., 14.2 mm. Paratype: cb. 39.0 mm; cl. 30.9 mm; fow., 25.0 mm; ft., 14.3 mm.

Material Examined: Colombia: Quebrada Tinajon, near Montería, tributary of the Rio Sinú, Dept. Córdoba; 18 April 1962; C. Z. Valasques and R. Comacho; two males.

Type and Distribution: Both specimens are deposited in the United States National Museum; the holotype (USNM-139122); the paratype (USNM-139123). Known only from the type locality.

Remarks: The following comparison is with *Dilocarcinus dentatus* from Venezuela. In *D. dentatus*, the gonopod curves and diminishes in size gradually, without the abrupt narrowing of *D. medemi*. The marginal process is not as prominent in *D. medemi* as in *D. dentatus*, and in the latter species there are very few long setae, except on the marginal process. In *D. dentatus* there is a prominent lateral tuft of stiff setae just proximal to the tip of the gonopod, and the margin curves around to the cephalic surface. The gonopods of the two species are entirely different, at a level which could be considered generic or subgeneric, and illustrates a common problem in Trichodactylidae, where there is a strong tendency toward parallelism or convergence in carapace characters, while the gonopods diverge strongly.





Figures 21–22. 21, *Sylviocarcinus gigas*, paratype male, carapace breadth 88.2 mm; 22, *S. gigas*, paratype female, carapace breadth 61.7 mm.

Figure 23. *Dilocarcinus medemi*, holotype male.

The carapace armature in the two species is very similar, the main difference being that the spines in *D. medemi* are sharper and more slender, particularly on the lower orbital border. The major chelae are differently shaped, being much deeper in *D. dentatus* than in *D. medemi*, with the fingers of the latter proportionately shorter.

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